AMENDMENTS TO THE CLAIMS

A detailed listing of all claims that are, or were, in the present application, irrespective of whether the claim(s) remains under examination in the application are presented below. The claims are presented in ascending order and each includes one status identifier. Those claims not cancelled or withdrawn but amended by the current amendment utilize the following notations for amendment: 1. deleted matter is shown by strikethrough for six or more characters and double brackets for five or less characters; and 2. added matter is shown by underlining.

1. (Currently Amended) A ~~component for a~~ fuel cell stack apparatus comprising at least a pair of plates and a membrane electrode assembly between the plates, each plate having a surface with at least one channel defined therein [[:]]

at least ~~body having~~ a ~~surface~~ portion of the surface of the plate adapted for repelling a liquid~~, said surface portion including~~ and comprising a substrate with a multiplicity of asperities thereon, each asperity having a cross-sectional dimension and an asperity rise angle relative to the substrate, the asperities being distributed so that the surface portion has a contact line density value measured in meters of contact line per square meter of surface area equal to or greater than a critical contact line density value "Λ_L" determined according to the formula:

$$\Lambda_L = \frac{-P}{\gamma \cos\left(\theta_{a,0} + \omega - 90^\circ\right)}$$

where P is a predetermined maximum expected pressure value at the surface portion, γ is the surface tension of the liquid, $\theta_{a,0}$ is the experimentally measured true advancing

contact angle of the liquid on the asperity material in degrees, and ω is the asperity rise angle.

2. (Currently Amended) The ~~component~~ fuel cell stack apparatus of claim 1, wherein the asperities are substantially uniformly shaped and dimensioned, wherein the asperities are arranged in a substantially uniform pattern, and wherein the asperities are spaced apart by a substantially uniform spacing dimension.

3. (Currently Amended) The ~~component~~ fuel cell stack apparatus of claim 2, wherein the ratio of the cross-sectional dimension of the asperities to the spacing dimension of the asperities is less than or equal to 0.1.

4. (Cancel)

5. (Currently Amended) ~~The component of claim 1, wherein said component is~~ A fuel cell stack apparatus comprising:

at least a pair of plates with a membrane electrode assembly between the plates, and a manifold operably coupled with the bi-polar plates and membrane electrode assemblies, the manifold having a surface portion adapted for repelling a liquid, said surface portion including a substrate with a multiplicity of asperities thereon, each asperity having a cross-sectional dimension and an asperity rise angle relative to the substrate, the asperities being distributed so that the surface portion has a contact line density value measured in meters of contact line per square meter of surface area equal to

or greater than a critical contact line density value "Λ_L" determined according to the formula:

$$\Lambda_L = \frac{-P}{\gamma \cos\left(\theta_{a,0} + \omega - 90^\circ\right)}$$

where P is a predetermined maximum expected pressure value at the surface portion, γ is the surface tension of the liquid, $\theta_{a,0}$ is the experimentally measured true advancing contact angle of the liquid on the asperity material in degrees, and ω is the asperity rise angle.

6. (Currently Amended) The ~~component~~ fuel cell stack apparatus of claim 1, wherein the asperities are projections.

7. (Currently Amended) The ~~component~~ fuel cell stack apparatus of claim 6, wherein the asperities are polyhedrally shaped.

8. (Currently Amended) The ~~component~~ fuel cell stack apparatus of claim 6, wherein each asperity has a generally square cross-section.

9.(Currently Amended) The ~~component~~ fuel cell stack apparatus of claim 6, wherein the asperities are cylindrical or cylindroidally shaped.

10. (Currently Amended) The ~~component~~ fuel cell stack apparatus of claim 1, wherein the asperities are cavities formed in the substrate.

11. (Currently Amended) The ~~component~~ fuel cell stack apparatus of claim 1, wherein the asperities have a substantially uniform asperity height relative to the substrate, and wherein the asperity height is greater than a critical asperity height value "Z_c" in meters determined according to the formula:

$$Z_c = \frac{d\left(1 - \cos\left(\theta_{a,0} + \omega - 180^\circ\right)\right)}{2\sin\left(\theta_{a,0} + \omega - 180^\circ\right)}$$

where d is the least distance in meters between adjacent asperities, $\theta_{a,0}$ is the experimentally measured true advancing contact angle of the liquid on the asperity material in degrees, and ω is the asperity rise angle in degrees.

12. (Currently Amended) A method of making a ~~component~~ bi-polar plate for a fuel cell stack apparatus, said ~~component~~ bi-polar plate having a surface portion adapted for repelling a liquid, the method comprising steps of:

forming a ~~component~~ bi-polar plate body having a surface and at least one channel in the surface; and

disposing a multiplicity of asperities on at least a portion of said surface, each asperity having a cross-sectional dimension and an asperity rise angle relative to the surface, the asperities positioned so that the surface has a contact line density measured in

meters of contact line per square meter of surface area equal to or greater than a critical contact line density value "Λ_L" determined according to the formula:

$$\Lambda_L = \frac{-P}{\gamma \cos\left(\theta_{a,0} + \omega - 90^\circ\right)}$$

where P is a predetermined maximum expected pressure value, γ is the surface tension of the liquid, $\theta_{a,0}$ is the experimentally measured true advancing contact angle of the liquid on the asperity material in degrees, and ω is the asperity rise angle.

13. (Original) The method of claim 12, wherein said asperities are substantially uniformly shaped, and wherein the step of disposing the asperities on the surface comprises disposing the asperities in a substantially uniform pattern so that the asperities are spaced apart by a substantially uniform spacing dimension.

14. (Original) The method of claim 13, wherein the asperities are disposed so that the ratio of the cross-sectional dimension of the asperities to the spacing dimension of the asperities is less than or equal to 0.1.

15. (Original) The method of claim 13, wherein the asperities are disposed so that the ratio of the cross-sectional dimension of the asperities to the spacing dimension of the asperities is less than or equal to 0.01.

16. (Original) The method of claim 13, further comprising the step of selecting a geometrical shape for the asperities.

17. (Original) The method of claim 13, further comprising the step of selecting an array pattern for the asperities.

18. (Original) The method of claim 13, further comprising the steps of selecting at least one dimension for the asperities and determining at least one other dimension for the asperities using an equation for contact line density.

19. (Original) The method of claim 12, wherein the step of disposing the asperities on the surface including forming the asperities by a process selected from the group consisting of nanomachining, microstamping, microcontact printing, self-assembling metal colloid monolayers, atomic force microscopy nanomachining, sol-gel molding, self-assembled monolayer directed patterning, chemical etching, sol-gel stamping, printing with colloidal inks, and disposing a layer of carbon nanotubes on the surface.

20. (Original) The method of claim 12, wherein the step of disposing the asperities on the surface including forming the asperities by extrusion.

21. (Original) The method of claim 12, further comprising the step of determining a critical asperity height value "Z_c" in meters according to the formula:

$$Z_c = \frac{d\left(1 - \cos\left(\theta_{a,0} + \omega - 180^\circ\right)\right)}{2\sin\left(\theta_{a,0} + \omega - 180^\circ\right)}$$

where d is the least distance in meters between adjacent asperities, $\theta_{a,0}$ is the true advancing contact angle of the liquid on the surface in degrees, and ω is the asperity rise angle in degrees.

22. (Currently Amended) A fuel cell stack apparatus including at least one component selected from the group consisting of a separator plate, a manifold, a membrane electrode assembly, a vent, a pipe, and an enclosure, the component having a surface portion adapted for repelling a liquid, said surface portion including a substrate with a multiplicity of asperities thereon, each asperity having a cross-sectional dimension and an asperity rise angle relative to the substrate, the asperities being distributed so that the surface portion has a contact line density value measured in meters of contact line per square meter of surface area equal to or greater than a critical contact line density value "Λ_L" determined according to the formula:

$$\Lambda_L = \frac{-P}{\gamma\cos\left(\theta_{a,0} + \omega - 90^\circ\right)}$$

where P is a predetermined maximum expected pressure value at the surface portion, γ is the surface tension of the liquid, $\theta_{a,0}$ is the experimentally measured true advancing contact angle of the liquid on the asperity material in degrees, and ω is the asperity rise angle.

23. (Original) The apparatus of claim 22, wherein the asperities are substantially uniformly shaped and dimensioned, wherein the asperities are arranged in a substantially uniform pattern, and wherein the asperities are spaced apart by a substantially uniform spacing dimension.

24. (Original) The apparatus of claim 23, wherein the ratio of the cross-sectional dimension of the asperities to the spacing dimension of the asperities is less than or equal to 0.1.

25. (Currently Amended) The ~~component~~ apparatus of claim 22, wherein said component is a bipolar plate.

26. (Original) The apparatus of claim 22, wherein said component is a manifold.

27. (Original) The apparatus of claim 22, wherein the asperities are projections.

28. (Original) The apparatus of claim 26, wherein the asperities are polyhedrally shaped.

29. (Original) The apparatus of claim 26, wherein each asperity has a generally square cross-section.

30. (Original) The apparatus of claim 26, wherein the asperities are cylindrical or cylindroidally shaped.

31. (Original) The apparatus of claim 22, wherein the asperities are cavities formed in the substrate.

32. (Original) The apparatus of claim 22, wherein the asperities have a substantially uniform asperity height relative to the substrate, and wherein the asperity height is greater than a critical asperity height value "Z_c" in meters determined according to the formula:

$$Z_c = \frac{d\left(1 - \cos\left(\theta_{a,0} + \omega - 180^\circ\right)\right)}{2 \sin\left(\theta_{a,0} + \omega - 180^\circ\right)}$$

where d is the least distance in meters between adjacent asperities, $\theta_{a,0}$ is the experimentally measured true advancing contact angle of the liquid on the asperity material in degrees, and ω is the asperity rise angle in degrees